AMENDMENT TO THE CLAIMS

In the Claims:

Please **CANCEL** claim 36 without prejudice or disclaimer;

Please **AMEND** claims 34 and 53; and

Please **ADD** new claims 54-59 as follows:

A copy of all pending claims and a status of the claims is provided below.

1. (Original) A method of measuring performance of a device, comprising:

thermally coupling a first heating device to a first sensing device;

generating heat at the first heating device;

measuring a change in at least one electrical characteristic of the first sensing device caused by the heat generated at the first heating device; and

calculating a temperature of the first heating device using the measured change in the at least one electrical characteristic.

2. (Original) The method of claim 1, wherein the calculating step is further based on a temperature versus power level relationship for the first heating device using the measured change in the at least one electrical characteristics of the of the first sensing device at different power levels and different distances from the first heating device.

3. (Original) The method of claim 1, wherein the at least one electrical characteristic is a sub-threshold voltage slope.

4. (Original) The method of claim 1, wherein the measuring step includes measuring a series of measurements between the first sensing device and the first heating device at varying amounts of power applied to the first heating device.

5. (Original) The method of claim 1, wherein the measuring step includes measuring a series of measurements between the first sensing device and the first heating device at varying distances.

6. (Original) The method of claim 1, wherein the first heating device and the first sensing device are a field effect transistor.

7. (Original) The method of claim 1, wherein the at least one electrical characteristic comprises drain current versus gate bias voltage.

8. (Original) The method of claim 1, wherein the at least one electrical characteristic comprises sub-threshold voltage slope swing.

9. (Original) The method of claim 1, wherein thermally coupling the first heating device to the first sensing device is through silicon and comprises thermally coupling the first heating device to the first sensing device through a prescribed length of silicon.

10. (Original) The method of claim 5, wherein the thermally coupling is a distance between about 0.01 to about 5 μm.

11. (Original) The method of claim 1, further comprising calibrating the first sensing device by measuring a particular electrical characteristic of an active region of the first sending device held at a known ambient temperature.

12. (Original) The method of claim 11, wherein the first sensing device is held at a known temperature and a sub-threshold voltage slope is measured incrementally in a range from 0-0.4 volts driving voltage of the first sensing device.

13. (Original) The method of claim 12, wherein the sub-threshold voltage slope is measured incrementally at about 0.01V.

14. (Original) The method of claim 1, wherein generating heat at the first heating device comprises generating a substantially steady state heating, and measuring a change in at least one electrical characteristic of the first sensing device caused by the heat generated at the first heating device comprises measuring a substantially steady state change in the at least one electrical characteristic.

15. (Original) The method of claim 1, further comprising measuring a change in the at least one electrical characteristic of the first sensing transistor at room temperature.

16. (Original) The method of claim 1, wherein generating heat at the first heating device comprises running a current through the first heating device.

17. (Original) The method of claim 1, further comprising thermally coupling the first heating device to a second sensing device through silicon and measuring a change in at least one electrical characteristic of the second sensing device caused by the heat generated at the first heating device.

18. (Original) The method of claim 1, further comprising: thermally coupling a second heating transistor to a second sensing transistor through silicon; generating heat at the second heating transistor; and measuring a change in at least one electrical characteristic of the second sensing transistor caused by the heat generated at the second heating transistor.

19. (Original) The method of claim 1, wherein:

the generating step includes generating heat at the first heating device with a first number of contacts and a second number of contacts;

the measuring step includes:

measuring a change in at least one electrical characteristic of the first sensing device caused by the heat generated at the first heating device with the first number of contacts;

measuring a change in at least one electrical characteristic of the first sensing device caused by the heat generated at the first heating device with the second number of contacts; and

the calculating step includes: calculating a temperature of the first heating device with the first number of contacts and the second number of contacts using the measured change in the at least one electrical characteristic; and

extrapolating results of the measurement obtained with the first number of contacts and the second number of contacts to zero contacts.

20. (Original) The method of claim 1, further comprising:

determining an offset between the first heating device and at least a second heating device, each having a different number of contacts; and

extrapolating the offset to zero contacts.

21. (Original) The method of claim 1, wherein the measurement step includes establishing an amount of temperature change per contact between the first heating device and a second heating device having a different number of contacts and the calculating step includes extrapolating results of the measurement step to zero contacts to determine an actual device temperature without an offsetting effect of the contacts.

22. (Original) The method of claim 19, wherein the second number of contacts is provided by subtracting at least one contact from the first number of contacts.

23. (Original) The method of claim 19, wherein the second number of contacts is provided by adding at least one contact to the first number of contacts.

24. (Original) The method of claim 1, wherein the measurement step includes providing a measurement differential taken with the first heating device and a second heating device having a different number of contacts.

25. (Original) A method of measuring performance of a device, comprising:

thermally coupling a heating transistor to a measurement transistor at one or more predetermined distance;

calibrating the measurement transistor by measuring a particular electrical characteristic of an active region of the measurement transistor with the measurement transistor held at a known temperature;

generating heat at the heating transistor;

incrementally measuring a change in the at least one electrical characteristic of the measurement transistor caused by the heat generated at the heating transistor; and

calculating a temperature of the heating transistor using the measured change in the at least one electrical characteristic.

26. (Original) The method of claim 25, wherein the calculating step is further based on a temperature versus power level relationship for the heating transistor based on an extrapolated form fitting curve.

27. (Original) The method of claim 25, wherein the calculating step is further based on using measured change in the at least one electrical characteristics of the of the first measurement transistor at different power levels and different distances from the heating transistor.

28. (Original) The method of claim 25, wherein the at least one electrical characteristic is at least one of a sub-threshold voltage slope, drain current versus gate bias voltage and a sub-threshold voltage slope swing.

29. (Original) The method of claim 25, wherein the measuring step includes measuring a series of measurements between the measurement transistor and the heating transistor at varying distances.

30. (Original) The method of claim 25, wherein thermally coupling the heating transistor and the measurement transistor is through silicon and comprises thermally coupling the heating transistor to the measurement transistor through a prescribed length of silicon.

31. (Original) The method of claim 25, wherein the calibrating step includes the measurement transistor being held at a known temperature and a sub-threshold voltage slope is measured incrementally in a range from 0-0.4 volts driving voltage of the first sensing device.

32. (Original) The method of claim 25, wherein the calibrating step includes determining a variation of at least one of the electrical characteristics of the measurement transistor as a function of temperature.

33. (Original) The method of claim 32, wherein the calibrating step is taken at various distances between the measurement transistor and the heating transistor.

34. (Currently Amended) An apparatus for measuring semiconductor device temperature, comprising:

a silicon island; ~~and~~

at least one pair of transistors, each pair of the at least one pair of transistors comprises a transistor configured to generate heat and a transistor configured to sense temperature;~~,~~

<u>the transistor configured to generate heat and the transistor configured to sense temperature being arranged on the silicon island; and</u>

<u>a common source contact being arranged on the silicon island and leading to the source of both the transistor configured to generate heat and the transistor configured to sense temperature</u>,

wherein each transistor of each pair of transistors is arranged a prescribed distance from its corresponding transistor.

35. (Original) The apparatus of claim 34, wherein the prescribed distance ranges from about 0.1 μm to about 5 μm.

Claim 36 (Canceled).

37. (Original) The apparatus of claim 34, wherein: the transistor configured to generate heat is configured to have a current selectively run through it, and the transistor configured to sense temperature is configured to produce a change in at least one of electrical characteristic of the transistor configured to sense temperatures, the change is proportional to heat generated by the transistor configured to generate heat.

38. (Original) The apparatus of claim 37, further comprising a circuit to sense the change in the at least one electrical characteristic.

39. (Original) An apparatus for measuring semiconductor device temperature, comprising:

at least one silicon island;

at least one heating field effect transistor configurable to generate heat arranged within the silicon island;

at least one sensing field effect transistor arranged within the at least one silicon island corresponding to each heating field effect transistor of the at least one heating field effect transistor, wherein each sensing field effect transistor is arranged a prescribed distance from its corresponding heating field effect transistor and each sensing field effect transistor is configurable to sense a temperature; and

means to calculate a temperature of the each heating field effect transistor using a measured change in at least one electrical characteristic of the each sensing field effect transistor caused by the heat generated at the each heating field effect transistor.

40. (Original) The apparatus of claim 39, wherein the at least one silicon island is at least partially surrounded by an insulator.

41. (Original) The apparatus of claim 39, wherein the prescribed distance ranges from about 0.1 μm to about 5 μm.

42. (Original) The apparatus of claim 39, wherein the at least one silicon island includes a first silicon island including a single sensing and a single heating field effect transistor arranged a first prescribed distance apart, and a second silicon island including a single sensing and a single heating field effect transistor arranged a second prescribed distance apart.

43. (Original) The apparatus of claim 39, wherein the at least one heating field effect transistor is a first heating field effect transistor having a first number of contacts and a second field effect transistor having a second, different number of contacts, each configurable to generate heat arranged within the silicon island.

44. (Original) The apparatus of claim 43, wherein the calculating means calculates a temperature of the first heating field effect transistor and the second heating field effect transistor using the measured change in the at least one electrical characteristic and extrapolates results of the measurement to zero contacts.

45. (Original) The apparatus of claim 39, wherein the calculating means uses an offset between a first heating field effect transistor and at least a second heating field effect transistor of the at least one heating field effect transistor, each having a different number of contacts and extrapolates the offset to zero contacts.

46. (Original) The method of claim 43, wherein the at least one sensing field effect transistor senses a temperature of the first heating field effect transistor and a second heating field effect transistor and the calculating means extrapolates results of the sensed temperature differences to zero contacts to determine an actual device temperature without an offsetting effect of the contacts.

47. (Original) An apparatus for determining the temperature of an active region of a semiconductor device, comprising:

three silicon sections;

three pairs of active regions, wherein each pair of active regions is arranged on a respective silicon section, wherein each pair of active regions is configurable to produce and sense heat; and

three thermal conductors, wherein each thermal conductor is arranged between each active region of each respective pair of active regions.

48. (Original) The apparatus of claim 47, wherein each silicon section is substantially thermally isolated from each other silicon section.

49. (Original) The apparatus of claim 47, wherein each thermal conductor has a prescribed length different from each other prescribed length of thermal conductor.

50. (Original) The apparatus of claim 49, wherein at least one prescribe length of each prescribed length is in a range from about 0.1 μm to about 5.0 μm.

51. (Original) The apparatus of claim 47, wherein:

the each pair of active regions comprises a heating region and a sensing region,

the each heating region converts electrical energy into thermal energy, and

the each sensing region senses heat by changing an electrical characteristic of the sensing region in accordance with the sensed heat.

52. (Original) The apparatus of claim 51, wherein the electrical characteristic comprises drain current versus gate bias voltage, a sub-threshold voltage slope swing.

53. (Currently Amended) A computer program product comprising a computer usable medium having readable program code embodied in the medium, the computer program product includes at least one component to:

arrange a common source contact on a SiGe island, the common source contact leading to a source of both a first heating device and a first sensing device;

measure a change in at least one electrical characteristic of [[a]] the first sensing device caused by heat generated at [[a]] the first heating device; and

calculate a temperature of the first heating device using the measured change in the at least one electrical characteristic.

54. (New) The method of claim 1, further comprising:

arranging the first heating device and the first sensing device on an SiGe island; and

using a common source contact which leads to the source of both the first heating device and the first sensing device.

55. (New) The method of claim 25, further comprising:

arranging the heating transistor and the measurement transistor on an SiGe island; and

using a common source contact which leads to the source of both the heating transistor and the measurement transistor.

56. (New) The apparatus of claim 34, further comprising:

a heating gate contact being arranged on the silicon island and coupled to the transistor configured to generate heat; and

a measurement gate contact being arranged on the silicon island and coupled to the transistor configured to sense temperature.

57. (New) The apparatus of claim 39, further comprising:

a common source contact leading to the source of both the heating field effect transistor and the corresponding sensing field effect transistor.

58. (New) The apparatus of claim 47, further comprising:

a heating field effect transistor and a corresponding sensing field effect transistor arranged in each of the three active regions; and

in each of the three active regions, a common source contact leading to a source of both the heating field effect transistor and the corresponding sensing field effect transistor.

59. (New) The computer program product of claim 53, wherein the first heating device and the first sensing device are arranged on the SiGe island.